

REMARKS

Claims 1-20 are pending in the application. Claims 1 and 9 have been amended. No new matter has been added. The amendments to claims 1 and 9 have not narrowed the scope of these claims. Reconsideration of the claims is respectfully requested.

Objection to the Detailed Description

In paragraph 1, the Examiner states that the abstract of the disclosure is objected to because the detailed description recited the reflector (100) may be tuned and it is unclear how the reflector (100) can be tuned (emphasis added). Applicant respectfully requests clarification of the objection. If the abstract is objected to, why does the Examiner refer to the Detailed Description? Applicant has assumed that it is the Detailed Description that is objected to.

It is further stated in the objection that col. 4, line 18 [sic] recites injecting charge carriers into the layer (102), and that it is unclear how to injected [sic] charge carriers and whether [sic] they are electric current or optical signal? This sentence is confusing. Applicant has attempted to respond as fully as possible, but does not understand what is meant by the phrase "electric current of the optical signal".

The paragraph of the present specification, starting at page 4, line 13, and referring to FIG. 1, describes a Bragg reflector formed in a semiconductor device. Light is guided in the waveguide layer (102). The light is reflected by a periodic grating 106. The reflector is tuned by injecting charge carriers into the waveguide layer, which is well understood. For example, the Examiner is referred to Re 36, 710, cited by the Examiner, col. 3, lines 23-25 where the tuning of a reflector structure by current injection is described. Applicants respectfully assert that the first paragraph starting at page 4, line 13 is clear and would be understood by one of ordinary skill in the art. If the Examiner disagrees, he is requested to clarify any problems with the Specification.

Rejection Under 35 U.S.C. § 112

Claims 1-20 are rejected under 35 U.S.C. § 112, second paragraph, for being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This rejection is unclear. It is stated in the Office

Action that the claims fail to define the different [sic] between a tunable laser and a tunable waveguide microelectronic structure and its operation functions of compensating for loss. Applicant is unsure what is meant by this statement. The claimed method is as set forth in claim 1 and the claimed structure is as set forth in the claim 9. Applicant believes that the claims are clear and not vague, and comply with 35 U.S.C. § 112. Applicant is unsure why there is any requirement under § 112 to distinguish between a tunable laser filter and a tunable waveguide microelectronic structure: this statement appears to be based more on distinguishing the invention from the prior art than from any vagueness in the language of the claim. If the Examiner persists in this rejection, he is requested to restate the reasons for the rejection.

It is also stated that the claims fail to provide any means, any laser structure, structural relationship to support a tunable laser filter which renders the claim confusing [sic]. Applicant respectfully points out that claim 1 is a method claim and, therefore, has no requirement to recite structure. Furthermore, claims 1 and 9 have been amended so that the preamble refers to a tunable optical filter. Claim 9, which is an apparatus claim, does describe structure and the relationship between the structural elements. For example, claim 9 includes a tunable waveguide formed from a tuning material and also includes an amplifying material having a different composition from the tuning material and disposed in a parallel relationship with the tunable waveguide. Thus, structural elements and their relationship are provided in claim 9.

It is also stated in the Office Action that the claims recite tunable material and amplifying material, and that the claims fail to define what kind of material can be used [sic] for tunable material and amplifying material. It is also stated that it is unclear as to how the amplifying material is being used for amplifying which renders the claims confusing, vague and indefinite.

Applicant respectfully disagrees. Applicant contends that there is no requirement that the claim recite what kind of material can be used for tunable material and amplifying material, and that the terms "amplifying material" and "tuning material" would be understood to one of ordinary skill in the art. To insert the information into the claim as required by the Examiner would greatly reduce the scope of the claim from that to which Applicant is entitled. Applicant contends that "amplifying material" and "tunable

material" are supported in the Specification and, since they would be understood by one of ordinary skill in the art, satisfy 35 U.S.C. § 112.

As regards the statement that it is unclear how the amplifying material is being used for amplifying, the Examiner is referred to page 5, lines 8-25, where optical gain with semiconductors is discussed. One of ordinary skill in the art would understand from that discussion and from background knowledge how optical amplification takes place within a semiconductor. Therefore, there is no vagueness concerning the amplifying material.

Applicant respectfully contends that the claims comply with 35 U.S.C. § 112.

Rejection Under 35 U.S.C. § 102(b)

Claims 1-20 are rejected under 35 U.S.C. §102 (b) as being anticipated by Sahlen (U.S. Patent 5,416,866). Sahlen teaches an optical waveguide/grating device for filtering optical wavelengths. A tunable optical filter has a wavelength selective optical filter that includes a grating structure arranged in a waveguide structure. The grating structure is formed so that it comprises two controllable grating sections electrically isolated from each other and which have different grating periods.

Sahlen teaches that an active layer (5) of InGaAsP, which is intrinsic, not doped, and thus causes changes in refractive index, is arranged on a substrate(3) (col. 3, lines 51-57). A waveguide layer (6) is grown above the active layer (5), and different gratings with different periods are etched on the waveguide layer (col. 3, line 66 – col. 4, line 3).

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim."

Richardson v. Suzuki Motor Co., 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Therefore, all claim elements, and their limitations, must be found in the prior art reference to maintain a rejection based on 35 U.S.C. §102. Applicants respectfully submit that Sahlen does not teach every element of independent claims 1 and 9, and therefore fails to anticipate claims 1-20.

Independent claim 1 is directed to a method of compensating for losses in a tunable optical filter that includes a waveguide formed from tunable material and an amplifying material disposed in a parallel relationship with the tunable material. The tuning and amplifying materials having different compositions. The method comprises injecting charge carriers into the tunable material and amplifying material simultaneously so that the amplifying material provides gain to light propagating along the tunable material waveguide and so that the refractive index of the tunable material is changed to a desired value.

Independent claim 9 is directed to a tunable optical filter that comprises a tunable waveguide formed from a tuning material. The filter also comprises an amplifying material having a composition different from the composition of the tuning material. The amplifying material is disposed in a parallel relationship with the tunable waveguide so as to amplify light propagating along the tunable waveguide.

It is important first to note that Sahlen fails to teach the incorporation of optically amplifying material in a parallel relationship with the waveguide into his filter. Instead, Sahlen teaches an “active” material, whose only described function is to change refractive index. It is well known that the term “active” means that the material responds to an applied electric voltage. It is also known that the refractive index of a semiconductor material, such as InGaAsP suggested by Sahlen, may be changed under the application of an electric field: this is the meaning that is attached to the term “active” in Sahlen’s disclosure. This is further emphasized at col. 5, lines 52-54, where Sahlen states that an active layer of undoped indium gallium arsenide phosphide (i-InGaAsP) ...causes the change in refractive index. Furthermore, at col. 6, lines 9-30, Sahlen discusses a device that incorporates an optical amplifier (16). Sahlen states that the active material in the amplifying section has a bandgap which is smaller than that in the active layer 5' of the grating section...so that stimulated amplification is obtained at the signal wavelength when a current is injected (emphasis added). Thus, Sahlen draws a distinction between the amplifying section (16), which produces stimulated amplification, and the active layer (5' or 5), which does not.

Accordingly, Sahlen fails to teach amplifying material in parallel relationship with the tunable waveguide. Thus, Sahlen fails to teach all the elements of independent claims 1 and 9, and these claims are allowable over Sahlen.

Dependent claims 2-8 and 10-20, which are dependent from independent claims 1 and 9, were also rejected under 35 U.S.C. §102(b) as being unpatentable over Sahlen. While Applicants do not acquiesce with the particular rejections to these dependent claims, it is believed that these rejections are moot in view of the remarks made in connection with independent claims 1 and 9. These dependent claims include all of the limitations of the base claim and any intervening claims, and recite additional features which further distinguish these claims from the cited references. Therefore, dependent claims 2-8 and 10-20 are also in condition for allowance.

Regarding claim 4, it is stated in the Office Action that Sahlen discloses disposing repeated lengths of amplifying material along a direction parallel to the waveguide, as shown in Figure 1. Applicant respectfully disagrees. Figure 1 shows no amplifying material.

In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Iain A. McIntyre at 952-253-4110.

Respectfully submitted,

Altera Law Group, LLC



Date: May 5, 2003

By:

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A handwritten signature in black ink, appearing to read "Iain A. McIntyre". It is written over a horizontal line.